Implementing a Commercial Rule Base as a Medication Order Safety Net

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A commercial rule base was used to identify drug orders exceeding standard dosage limits at a university hospital. Initially, there were substantial numbers of clinically insignificant alerts. A method for altering the commercial rule base will be implemented to increase rule specificity for problematic drugs. With minor modifications, commercial rule bases can be used to rapidly create a safety net that screens drug orders for excessive dosages, while preserving the rule architecture for more finely tuned clinical decision support.

Background

Medication errors are a national concern.[1] Safety nets are needed to prevent adverse drug events resulting from prescribing errors.[2] The effectiveness of rule-based clinical decision support (CDS) is diminished by poor specificity. We suggest a strategy for rapidly deploying asynchronous CDS with acceptable sensitivity and specificity.

Methods

A commercial rule base (Cerner Multum, Kansas City, MO) with rules for nearly 2000 drugs was implemented in Dec-02 at Barnes-Jewish Hospital (BJH), a university teaching hospital. In order to assess rule performance, 187 drugs were initially chosen for inclusion based upon their potential to cause dose-related toxicity. Maximum single dose, maximum daily dose, and maximum frequency rules were implemented. Subsequently, maximum single dose limits were retrospectively evaluated for an additional 1251 drugs at BJH and 4 additional community hospitals in the BJC Health System.

Results

From 1-1-03 to 2-1-03 at BJH, there were 10,514 orders screened resulting in 409 alerts for an alert rate of 3.9%. Of these alerts, clinical pharmacist assessment was recorded for 346 (85%). Of these, pharmacists agreed and contacted the MD with 44 (13%) and disagreed with 302 (87%). Because of this high rate of disagreement, we next focused our efforts on maximum single dose rules. From 1-1-03 to 2-1-03, 192,668 drug orders from five BJC Healthcare facilities were screened retrospectively for maximum single dose limits, resulting in 17,667 violations. Of these violations, 13,366 (76%) were from the teaching hospital while it accounted for only 56% of the orders screened. Further, 90% of the alerts were the result of 58 drug rules.

Table. Maximum single dose limits

Facility	Orders screened	Alerts	Alert Rate
A	108,412	13,366	12.3%
B	40,176	2,413	6.0%
C	30,795	1,454	4.7%
D	8,669	262	3.0%
E	4,616	172	3.7%
Total	192,668	17,667	9.2%

Conclusions

Implementing rules directly from a commercial vendor resulted in unacceptably high disagreement rates at a university teaching facility. A method for employing a dose-limit multiplier will be devised to preserve the architecture of the commercial rules for finer tuning of therapy in later implementation phases, without impacting the monthly rule update process. Although this strategy will result in some development costs, it will still result in lower maintenance costs and more rapid implementation than creating a new rule base. Disagreement rates can be reduced to an acceptable level for clinicians and a dose-limit safety net established for a large number of drugs within a very short period of time by applying minor modifications to a commercial rule base. Once the safety net is established, a more deliberate approach can be taken for fine-tuning of problematic commercial rules.

References

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